10.—A progeny trial to obtain evidence of hybridity in two taxa of Eucalyptus

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Communicated by M. J. H. Brooker
Manuscript received 22 February 1972; accepted 21 November, 1972

Abstract

A trial was conducted with progeny of *Eucalyptus erythrandra* Blakely and Steedman, and of *E. forrestiana*. Examination of surviving plants after seven years is considered to show that the former taxon is a hybrid form whereas the latter is not.

Introduction

In November 1962 seed was collected from two individuals of *Eucalyptus erythrandra* Blakely and Steedman on the Ravensthorpe-Esperance road about 30 km east of Ravensthorpe. Another seed collection was made from a population of small trees of *E. forrestiana* Diels near the 540 mile peg on the Esperance-Norseman road between Scaddan and Truslove.

E. erythrandra was described by Blakely in 1938 from a specimen collected by H. Steedman at Kundip, west of Ravensthorpe. Gardner, however, in 1933 described the same taxon as a new variety, var. *robusta*, of *E. angulosa* Schau., and later (Gardner, 1940) announced that "I have since received, through the Conservator of Forests, specimens of this plant collected by Mrs. Daniells of Hopetoun, which exhibit a perfect series embracing on the one hand *E. tetraptera* Turcz., and *E. angulosa* Schau. on the other. Amongst the intermediate forms is typical *E. erythrandra*, which I consider to be a hybrid. The evidence in favour of this theory is quite clear."

Progency were raised from the two seed collections of *E. erythrandra* in the King's Park Arboretum to seek evidence for hybridity. The same was done with the seed collection of *E. forrestiana*.

The taxonomy of *E. forrestiana* has recently been clarified (Brooker 1973). The specimen and seed collected by the writer in 1962 are now correctly referred to as *E. forrestiana* Diels subsp. *forrestiana* and there is no reason to suspect interspecific hybridity. In 1962 however, the name *E. forrestiana* was being incorrectly restricted to a form of the species, occurring in the same locality, which differs in having a long beak to the operculum. This taxon has since been described as *E. forrestiana* subsp. *dolichorhyncha* M. I. H. Brooker.

In 1962 the late Mr. C. A. Gardner considered the writer's collection to be possibly a hybrid between *E. forrestiana* (as then conceived) and *E. stoatei* C. A. Gardn., and the seed was therefore included in the progeny trial.

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Results

Seed from the collections made was sown in the King's Park nursery in summer 1962-1963, as follows:—

E. erythrandra. Accession Nos. 2167/62, 2170/62 = voucher specimen JSB. 2283.

E. forrestiana. Accession No. 2155/62, voucher specimen JSB. 2343a.

Plots were planted in the arboretum in May 1963 at 12′ x 12′ (3.45 x 3.45 m.).

2167/62, 4 lines of 9 = 36 plants
2170/62, 4 lines of 9 = 36 plants
2155/62, 9 lines of 10 = 90 plants

Each year thereafter the plants were weeded and watered weekly in summer. An assessment was made in May 1967, when in the 2155/62 progeny *(E. forrestiana)* there were 50 survivors ranging in height from 0.5 to 2 m., the larger ones coming into flower. Of 39 flowering specimens all reproduced the parental characteristic of short operculum and 4-ribbed fruit. In the two plots of *E. erythrandra* both survival and growth were poor. Only 22 plants out of 72 remained and these were mostly small and weak, with few flowering. It was observed however that there was a marked segregation into types resembling both reputed parents of the hybrid, *E. tetraptera* and *E. angulosa* (Gardner 1940).

Final assessment was deferred until April 1970, seven years after planting, with this result—

E. forrestiana. 46 survivors, 1.5-3 m tall, all flowering and fruiting copiously but fruits shed prematurely without liberating seed. No apparent differences between individuals in habit of tree or leaf size or shape. Short operculum, 46 (100%). 4 major ribs on fruit, 46 (100%). Indications of minor ribbing on fruit between major ribs, 13 (28%). Slight variations in fruit length and thickness, and in the peduncle, appear but not seeming significant.

E. erythrandra. 20 plants of which 2 dead; these still had leaves and were included in the examination. Plants very variable, 12 assessed as resembling *E. angulosa* (upright branching habit, smaller, thinner leaves, compound inflorescences, small fruit of *E. angulosa* type), 5 resembling *E. tetraptera* (straggly and decumbent form, thick large rigid leaves, large solitary 4-angled fruit) and 3 intermediate. There was a difference between the two collections, progeny of 2167/62 having 4 *angulosa*-type, 5 *tetraptera*-type, 0 intermediates, 2170/62 having 8 *angulosa*-type, 0 *tetraptera*-type, 3 intermediates.

Conclusions

It is concluded that there is no evidence of hybridity in the progeny of *E. forrestiana* subsp. *forrestiana,* nor of variation to ssp. *dolichorhyncha.* There was no occurrence of the long-beaked form in the population, nor any intermediates.

On the other hand Gardner's supposition of hybridity in *E. erythrandra* is very clearly supported. The only consideration here lies in the identity of the reputed parents. *E. tetraptera* occurs in the mallee-heath communities, east of Ravensthorpe where *E. erythrandra* forms are found but *E. angulosa* does not, being a coastal species. *E. incrassata,* on the other hand, another member of the "dumosa" group and of which *E. angulosa* has been considered a variety by some authorities, does so, and this is probably the actual parent. It has smaller fruits than *E. angulosa* but is sufficiently close to it not to affect materially the comparisons in the progeny trial.

This paper is presented in order to draw attention to the utility of progeny trials conducted in Botanic Gardens to assist the elucidation of taxonomic problems.

References

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